

What is claimed is:

1. An optical transmission system, comprising:

(a) at least one directly modulated light source that generates and outputs a signal by direct modulation; and

5 (b) at least one optical fiber that:

(b1) constitutes the principal portion of an optical transmission line at at least one repeater section;

(b2) transmits a signal lightwave carrying at least one signal outputted by the at least one directly modulated light source;

10 (b3) has a chromatic dispersion that is negative at at least one wavelength of the signal lightwave; and

(b4) has a dispersion slope of at most $0.05 \text{ ps/nm}^2/\text{km}$ in absolute value at the at least one wavelength.

2. An optical transmission system as defined by claim 1, wherein the signal
15 lightwave carries at least three signals having a wavelength different from one another and has a wavelength band of not less than 40 nm.

3. An optical transmission system as defined by claim 1, wherein:

(a) the at least one wavelength is one wavelength, the wavelength being about 1550 nm; and

20 (b) the at least one optical fiber has a zero-dispersion wavelength of at least 1610 nm.

4. An optical transmission system as defined by claim 1, wherein the at least one optical fiber has an effective area of at most $60 \text{ } \mu\text{m}^2$ at the at least one

wavelength.

5. An optical transmission system as defined by claim 1, wherein the at least one optical fiber has a 2-m cutoff wavelength of at most 1600 nm.

6. An optical transmission system as defined by claim 1, wherein the at least one optical fiber has a chromatic dispersion of at least -16 ps/nm/km at the at least one wavelength.

7. An optical transmission system as defined by claim 1, wherein the at least one optical fiber has a chromatic dispersion of at least -16 ps/nm/km and at most 0 ps/nm/km at all the wavelengths of the signal lightwave.

8. An optical transmission system as defined by claim 1, wherein the or each signal corresponding to the at least one wavelength has an α parameter of at least 1.0 at the output end of the corresponding directly modulated light source.

9. An optical transmission system as defined by claim 1, wherein the at least one optical fiber has a feature expressed by the formula

$$\gamma P_{in} > 1.51 \times 10^{-6} / \text{m},$$

where γ is the non-linearity constant at the at least one wavelength, and P_{in} is the power of the signal lightwave to be inputted into the at least one optical fiber.

10. An optical transmission system as defined by claim 1, wherein when the or each signal corresponding to the at least one wavelength has a bit rate of B Gb/s, the total accumulated dispersion from the signal-transmitting end to the signal-receiving end is at least $-80,000/B^2$ ps/nm and at most 0 ps/nm at the or

each wavelength.

11. An optical transmission system as defined by claim 1, wherein the at least one repeater section has a length of at least 75 km.